Asset class vs. Service based approach for system services

smartEn Position Paper

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INTRODUCTION

Across Europe, participants in the electricity system have been changing rapidly. From a one-directional energy flow that went from traditional generation to consumers, to a circular electricity system, where renewable energies, storage, electric vehicles and prosumers now play an active role in both withdrawing and injecting electricity.

While suitable for most current and traditional technologies, the network code design is not designed to take full advantage of innovative technologies in the new decentralised energy landscape. The network codes depend on the definition of asset classes that are not suited for new technologies. For example, storage does not fit in the traditional definition of asset classes, which are either generation or demand. Storage can be a generation or consumption asset or both at the same time. Classifying resources incorrectly in one asset class limits the services it can provide, hindering its development, business case and the possibility for the system operator to use lower cost resources for balancing the grid.

The alternative to asset classes is to define the services required by the grid in a technology-agnostic way and allow different technologies to provide them. For this approach to work, smartEn calls ENTSO-E, ACER and the European Commission to shape a strategy to adapt those network codes, that are still built upon the concept of asset classes.

Benefits of a service – based approach	Downsides of asset – centric approach
- Optimal use of individual flexible assets by participating to various markets - Creates a level playingfield with historically established solutions - Encourages innovation and facilitates integration of DER - Lowers the system costs through increased flexibility and reduced monitoring costs	- Prevents Dynamic pooling of behind-the-meter (BTM) assets - Blocks BTM synergies between assets - Requires more measurement (more meters/submeters) - Creates large amounts of (unnecesary) data for SO to manage

Downsides of an asset-based approach

While the asset-based approach served the energy system well when the only two actors were (large) generation and demand, nowadays it risks the efficient integration of different Distributed Energy Resources (DER). With the emergence of prosumers and the generalisation of energy-positive buildings, most grid delivery points where only passive consuming assets where connected, will become active loads and sources.

Requirements for different ancillary services evolved over time. For example, the Frequency Containment Reserve (FCR) has seen its requirements and granularity increase over the past years. But also, the roles these products play have changed over time and even new needs have appeared, e.g., FFR compensating inertia decrease, or with longer activation times. Many of these changes in

requirements might have been prompted by new technologies entering the market, and limitations of the existing asset classes.

DERs can provide a wide range of services, individually or in mixed customer sites or pools. But requirements for them to participate should not and cannot be equated to requirements for traditional generation. Requirements for mixed customer sites are currently not really addressed in the existing network codes nor regulation. By focussing on the individual resource, and shying away from a holistic approach, where the focus is at an aggregate level, the existing resources are undervalued and underused, restricted by the asset class requirements that are assigned to them (e.g., having storage classed into either generation or demand limits the potential to use its full capacity). This can prevent system operators from sourcing the ancillary services they need at lower cost since some DER could provide them at a marginal cost.

In addition, other challenges arise from the asset-based approach that severely limit the integration of new technologies:

- It prevents the dynamic pooling of behind-the-meter resources, blocking synergies of these resources.
- It requires more measurement by system operators (SOs): more individual assets, require more meters and submeters.
- Data management: SOs receive unnecessarily large amounts of data from myriads of individual assets that are neither manageable nor always usable. While certain data is required to maintain system safety, only the absolute necessary should be required.
- It creates technological lock-in that prevents innovation, by limiting the roles that resources could play.

The service-based approach fits in the new roles of both SOs and aggregators that should be valorised as reliable market players able to deliver the required service. Technical prequalification requirements for pools, and strict penalties in case of non-delivery or under-delivery could strengthen the contribution by aggregators on the services required by SOs.

Benefits of a service-based approach

A service-based approach focuses on the services required by SOs, rather than on the assets that are providing such services.
With this approach, the product design is defined by a series of parameters required by the SO. These parameters can include technological aspects (e.g., frequency or power), the source of the energy (e.g., RES) or behavioural parameters (e.g., ramping, curve shape of delivery etc.).
The performance of the delivered service is then measured at grid-tie point by the DSO-provided smart meter.
With existing technologies any product-shape required by the SO can be shaped through power electronics and digital solutions, making any behind-the-meter resources able to deliver the required product if the prequalified pool is large enough.

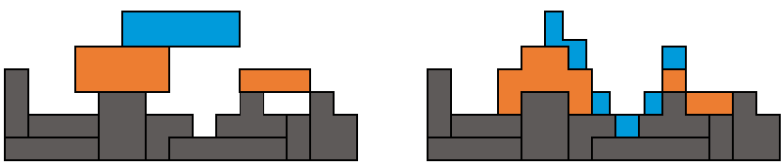

Figure 1 Loads can be shaped through digital solutions into the required product shape

Digital solutions and the activity of independent aggregators make it so that, to the effects of a SO, any resource can be made to look like a different asset. For example, a sufficiently large pool of electric vehicles would have the same capabilities as a stationary storage battery, and would be indistinguishable for the SO.

A service-based and technology-neutral approach applied to all DERs will enable aggregators to create mixed pools of different types of assets. Aggregators will have the ultimate responsibility of optimizing their portfolio, knowing the capabilities of the pooled assets, and provide services to both TSOs and DSOs. As shown in figure 1, each asset has its own profile, and through aggregation, the service provider can create the required profile at the grid-tie point.

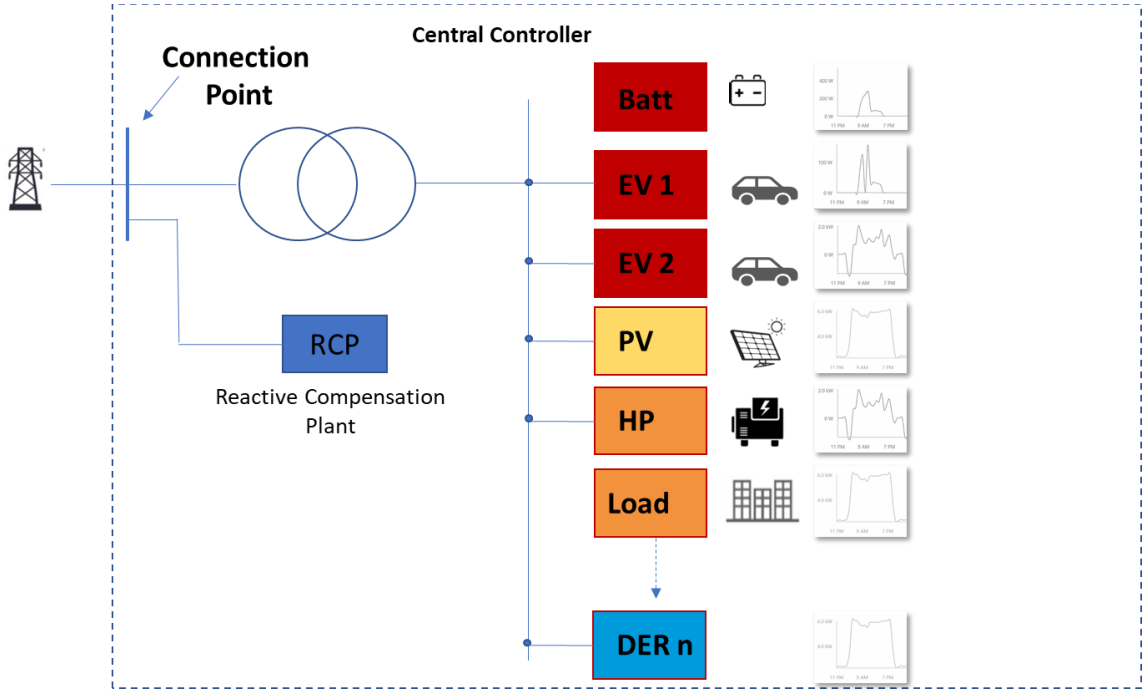

Figure 2 Pool of behind the meter DER

Other benefits from a service-based approach include:

- Simplification: Since all measurement is done at grid-tie point, all DERs would share the same standards. Pools behind the meter can be rearranged, should an asset need to be replaced, as long as the service is still delivered in the same way at the grid-tie point.
- Stacking of services: providing several services simultaneously, at transmission and distribution level as well as on-site optimisation.
- Innovation: less hurdles facilitate the inclusion of new technologies.
- Reliability: It is easier to measure and hold responsible one single connection point delivering a service rather than various different assets.
- Resiliency: an asset failure can create a single point of failure. A swarm of DERs can be re-arranged should a contingency arise to maintain the service level.

Bridging the gap

While smartEn believes the service-based approach will be more efficient in integrating a wide range of technologies, we acknowledge the efforts required to make a switch of that scale. The first step to achieve a full integration of all technologies is the complete implementation of the Clean Energy for All Europeans Package which already mandates a truly technical neutrality in all markets.

In addition, smartEn recommends an interim solution until the service-based approach is implemented. Storage, and behind-the-meter mixed pools of assets, should be allowed to participate in all services to the grid with an update by the relevant authorities of the current network codes. By including addenda to the existing network codes, these technologies should be able to participate within the current network code design, unrestricted by the less-than-optimal asset classes they are currently assigned to. Within this interim solution, storage, for example, could be considered a separate asset class or benefit from improved access conditions within each of the existing asset classes.

Recommendation

When defining new network codes or revising existing ones, the competent bodies should value DERs as service providers and not classify them into a specific asset class.

With a service-based approach, the needs of DSOs and TSOs are defined in certain products/services and the technologies that provide them should not be specified. Most importantly, the requirements for system services should be truly technology-inclusive. This approach guarantees that all DERs, in front, and behind the meter can participate, and that a service will be provided by the best suited resources. This will ensure the integration of all DERs and allow SOs and market participants to reap the benefits of a more flexible system, thus helping achieve the EU decarbonisation targets in a cost-effective way.

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The positions expressed in this document represent the views of smartEn as an association, but not necessarily the opinion of each specific smartEn member.
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